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IN THE UNITED STATES PATENT- AND TRADEMARK OFFICE

Applicant: Jochen Wehner
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Application no.: 10/572,784
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Examiner: Michael L. Leonard
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Title: TWO-COMPONENT COMPOSITION FOR
PRODUCING POLYURETHANE GEL
COATS FOR EPOXY-RESIN AND VI-
NYL-ESTER RESIN COMPOSITE MA-
TERIALS

Declaration under Rule 132

Commissioner for Patents
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Sir:

I, Dr. JOCHEN WEHNER, declare and state as follows:

1. I am currently employed by Mankiewicz Gebr. & Co (GmbH & Co. KG), the assignees of the above-referenced application. My present position and title are „Research and Development Manager - Head of General Industry“.

2. I am the inventor of several patent applications in the field of gel coats for composite materials for rotor

vanes for wind power plants. This includes the present application, as well as co-pending US application US 10/572,785.

3. I am familiar with the objections raised by the examiner in the examination proceedings of the present application. The obviousness objection raised by the examiner on the basis of Rosenberg et al. (U.S. Pat. 6,046,297) in view of Sondhe et al. (U.S. Pat. 5,340,652), and further in view of Motsinger et al. (U.S. Pat. 3,217,536) is amongst others based on the assumption that these documents are analogous art because the documents are concerned with the same field of endeavor. Moreover, the objection is based on the assumption that the presently claimed subject matter does not specify an order of mixing. As will be shown in detail below, in particular with reference to experiments that I performed, these assumptions are not correct.

4. The present invention is a process for the production of synthetic resin composite materials with polyurethane gel coats. The process comprises the mixing of a polyol component A) and a polyisocyanate component B) and at least partial curing of the mixture to form a gel coat material, and the bringing of the gel coat material into contact with synthetic resin. The synthetic resin comprises epoxy resin and/or vinyl ester resin.

5. Initially, a two-component composition is prepared. The first component, which is named polyol component A), contains one or several polyols and one or several aromatic amines. A separate, second component, termed polyisocyanate component B), contains one or several polyisocyanates.

6. After these two components are prepared from the respective constituents, the components are mixed. Upon mixing, a gel coat material is formed.

7. The gel coat material is finally brought into contact with a synthetic resin that is not, or not completely,

cured at the time when it is brought into contact with the gel coat material.

8. Since the polyol component containing one or several polyols and one or several aromatic amines is prepared first, and this component is then reacted with polyisocyanate in the polyisocyanate component, there is a statistical reaction of the polyol's hydroxyl groups and the amine's amino groups with the polyisocyanate's isocyanate groups. This ensures early gelling of the mixture, so as to form the gel coat material (long pot life but short tack off time), while at the same time ensuring excellent adhesion of the gel coat material to the synthetic resin (lamination time at room temperature is more than 72 hours). See the advantages of the invention as listed at page 15 of the English translation of the international application, items 2 to 4.

9. I will now turn to the teaching of Rosenberg. To start with, I note that the skilled person would not have taken Rosenberg into account because it does not relate to the production of composite materials as presently claimed. Rosenberg in accordance with col. 3, lines 32 to 34 teaches the production of industrial rolls such as paper mill rolls, industrial wheels and industrial tires, but not composites. Rosenberg is concerned with the reduction of the propensity of the polymerizing mass to crack. The problem of good adhesion of polyurethane material to a synthetic resin as required in accordance with the present invention is neither addressed nor important in the context of the applications taught in Rosenberg.

10. The present field of endeavor is not simply polyurethane compositions that are hardened with aromatic amines. The skilled person is aware of the fact that polyurethane compositions are used in a large variety of applications, e.g. casting compounds, coatings, electrical insulation materials, thermal insulation materials, slab stock foams, thermoplastic elastomers, foils, construction foams, rheology modifiers, textile fibers, wound dressings, protheses, adhe-

sives, or sealing materials, and these applications require very different polyurethane compositions. The skilled person will take those documents into account that relate to the specific application claimed, in this particular case a composite of a polyurethane gel coat with an epoxy resin and/or vinyl ester resin. Alternatively, the skilled person will take documents into account that are for instance concerned with the problem of good adhesion between polyurethane and epoxy resin and/or vinyl ester resin. Rosenberg meets neither of these criteria.

10. Moreover, the process taught by Rosenberg is completely different than the process according to the present invention. As is explained starting in col. 3, line 38 of Rosenberg, in a first step, a high molecular weight polyol is reacted with organic diisocyanate to produce a prepolymer having free TDI below 0.4 % by weight (optionally a mixture of a low molecular weight polyol and a high molecular weight polyol may also be reacted with the diisocyanate, see col. 3, lines 45 to 47 of Rosenberg). This initial reaction of the (aromatic amine-free) polyol component with isocyanate in accordance with Rosenberg results in the production of a prepolymer.

11. The polyol component that is reacted in accordance with Rosenberg with isocyanate simply does not contain aromatic amine. In fact, Rosenberg makes it absolutely clear in col. 3, lines 18 to 20 that components containing aromatic amine and polyol are undesirable! Rosenberg therefore explicitly teaches away from the present invention! Since no aromatic amine is present in the polyol component of Rosenberg, amino groups of aromatic amine cannot, in a mixture with hydroxyl groups of polyols, in a statistical manner react with isocyanate groups, as is the case in accordance with the present invention.

12. As a next step after the production of the prepolymer, Rosenberg teaches the removal of any free isocyanate. This is clear from col. 3, line 41 where the free TDI content

is specified to be below 0.4 % by weight, but also from col. 4, line 54; col. 5, lines 1 to 5.

13. In a final step of the process of Rosenberg, the prepolymer is cured with a curative, namely an aromatic amine. (see col. 5, starting in line 50). Thus, Rosenberg teaches the reaction of (isocyanate-free) prepolymer with amine. The skilled person knows that this is something completely different than the reaction of the admixture of amine and polyol with polyisocyanate.

14. The following experiments were performed by me in order to show that the order of mixing the constituents so as to form components, and the subsequent mixing of the components has a decisive influence on the course of the reaction.

15. I have, firstly, reacted the polyol components PA, PB and PC (containing aromatic amine) as set out in the English translation of co-pending WO2005/030893 (USSN 10/572,785) at page 21 in Tables 6 and 7, with the isocyanate mixtures HA, HB and HC as set out there in Table 7. After the "pot time", one obtains as reaction product a crosslinked polyurethane polymer that shows good adhesion to epoxy resin and/or vinyl ester resin.

16. In contrast thereto, amine-free polyol mixtures were prepared containing the polyols as set out above for PA, PB and PC, but without the light resistant aromatic amine MCDEA. This follows the teaching of Rosenberg. These amine-free polyol components were termed PA-amine free, PB-amine free, and PC-amine free. PA-amine free, PB-amine free, and PC-amine free were reacted with the same amounts of isocyanate mixture HA, HB, and HC (based on the mass of the isocyanate mixture). In all three cases, this reaction led to solid products. These are solid prepolymers, infusible and insoluble in common solvents. A reaction of these prepolymers with the aromatic MCDEA was not possible because the solid aromatic amine cannot be mixed with these solid prepolymers. It is self-explanatory that the comparative (attempted) reaction

of prepolymer with amine did not result in anything that could be called, or used as gel coat that would have adhered to synthetic resin.

17. Therefore, it has been shown that the reaction of prepolymer (prepared from polyol and isocyanate) with an aromatic amine gives a (comparative) product which differs from a gel coat for a composite material. Again, the gel coat of the present invention is prepared by reacting a polyol component (containing one or several polyols and one or several aromatic amines) with a polyisocyanate component.

18. For these reasons, Rosenberg is neither analogous art nor teaches the order of mixing of constituents so as to form components, and the subsequent mixing of components so as to form the gel coat material as required in accordance with the process presently claimed.

19. With regard to Sondhe, I note that this document, just like Rosenberg, also fails to teach the specific polyol component required, containing one or several polyols and one or several aromatic amines, as well as having a specific hydroxyl group concentration of 0.5 to 10 mol hydroxyl groups per kg of polyol component.

20. Finally, the teaching by Motsinger would not have been taken into account by the skilled person. It is completely silent with respect to a composite of polyurethane gel coat as presently claimed with a synthetic resin. The coatings exemplified in Motsinger are fluorocarbon resins (Teflon) and polyethylene, but not polyurethane gel coats (col. 4, lines 5 to 10 of Motsinger). Composites with epoxy resin and/or vinyl ester resin are also not taught.

20. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by

fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

By: 
Dr. Jochen Wehner

Date: 16. October 2009